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Acute Coronary Syndromes

THERMAL HETEROGENEITY IN CAROTID ARTERIES AS A SURROGATE MARKER FOR CORONARY ARTERY DISEASE

Poster Contributions
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Authors: *Maria I. Drakopoulou, Konstantinos Toutouzas, Konstantina Masoura, Archontoula Michelongona, Georgios Benetos, Elias Tolis, Pavlos Bounas, Eleftherios Tsiamis, Dimitrios Tousoulis, Elias Siores, Christodoulos I Stefanadis, First Department of Cardiology, Athens, Greece*

Background: Intima-media thickness (IMT) measurement in carotid arteries is a widely adopted noninvasive modality for predicting cardiovascular events. However, the accuracy of this method is mired by the fact that age-related thickening of intimal and medial layers also occurs in the absence of overt atherosclerosis involving inflammation. Microwave radiometry (MR) allows in vivo measuring of the internal temperature of tissues reflecting inflammation. The purpose of this study was to evaluate the predictive value of thermal heterogeneity measured by MR for the diagnosis of significant coronary artery disease (CAD).

Method: One hundred thirty-one consecutive patients hospitalized for chest pain and scheduled for coronary angiography were evaluated by 1) ultra-sound echo-color Doppler (US-ECD) study of both carotid arteries, and 2) temperature measurements with MR. During US-ECD study, the following parameters were analyzed: type of plaque, plaque morphology and homogeneity. During thermography, thermal heterogeneity (ΔT) was assigned as the maximal temperature along the carotid artery minus the minimum temperature. Subsequent association of thermography and ultrasound findings was performed.

Results: Significant CAD was found in 99 patients (75%) (CAD group) on coronary angiography. Mean IMT was significantly higher in carotid arteries of the CAD group (2.06±1.16 vs 0.50±0,19°C, $p<0.001$). Carotid arteries of the CAD group had higher ΔT (0.89±0.50 vs 0.26±0.09°C, $p<0.001$). Among carotid arteries with atherosclerosis (IMT>1.2mm), fatty plaques had higher ΔT compared to mixed and calcified plaques (1.54±0.43 vs 0.99±0.39 vs 0.60±0.53°C, $p<0.01$ for all comparisons). Plaques with irregular surface had higher ΔT compared to plaques with regular surface (1.32±0.40 vs 0.80±0.43°C, $p<0.01$). Heterogeneous plaques had higher ΔT compared to homogenous (1.55±0.41 vs 0.86±0.41°C, $p<0.01$).

Conclusions: It seems that microwave radiometry is a reproducible, feasible and safe method for the assessment of the functional characteristics of carotid plaques. Further studies are needed to validate this method as an additional tool for the prediction and/or exclusion of CAD.